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HABIT AND INSTINCT. By *C. Lloyd Morgan, F. G. S.* London and New York : Edward Arnold. 1896, Pages, 351.

The contents of the present work by Prof. C. Lloyd Morgan are already familiar to many Americans, as they formed the subject of the Lowell course of Lectures at Boston and of further lectures in New York, Chicago and other university centres during the early part of 1896. Some of the matter of the book has appeared in the *Fortnightly Review*, *Nature*, *Natural Science*, *The Monist*, *The Humanitarian*, *Science*, and reprints of many of the observations in *The Open Court*. As now collected, this matter forms a handsome, well printed volume having a beautifully engraved frontispiece of a group of young birds, and is divided into fifteen chapters. The first chapter treats of some Preliminary Definitions and Illustrations with special reference to the distinction between instincts and habits, as being in the one case congenital and in the other acquired. The second chapter treats of Some Habits and Instincts of Young Birds, the third of Locomotion in Young Birds, the fourth continues the Observations on Young Birds, the fifth deals with Young Mammals, the sixth with the important subject of The Relation of Consciousness to Instinctive Behavior, which lies at the basis of psychology; the seventh discusses Intelligence and the Acquisition of Habits, the eighth Imitation; the ninth, tenth, and eleventh deal respectively with The Emotions in their Relation to Instinct, Some Habits and Instincts of the Pairing Season, and Nest-Building, Incubation and Migration. The remaining four chapters, which in their general philosophic bearing are perhaps most important, are entitled, respectively, "The Relation of Organic to Mental Evolution," "Are Acquired Habits Inherited?" "Modification and Variation," and "Heredity in Man." We may refer briefly to some of their conclusions. The position of Prof. Lloyd Morgan with regard to the inheritance of acquired habits, is well known,—being a partial compromise between the Weismannian and Lamarckian views, although leaning decidedly towards the former. He says: "If pressed to summarise my own opinion on this vexed question, I should say, first, that there is but little satisfactory and convincing evidence in favor of transmission, but that variation does seem in some cases to have followed the lines of adaptive modification, so as to suggest some sort of connexion between them; secondly, that there are many instincts, relatively definite and stable, which may fairly be regarded as directly due to natural selection, though here again, if we could accept the view that adaptive modification marked out the lines in which congenital variation should run, our conception of the process of their evolution would be so far simplified; thirdly, that there are some peculiar traits, also seemingly definite and stable, which can only be attributed to the indirect effects of natural selection on the supposition that they form part of the congenital nexus, and that they have no intrinsic tendency to variation in any particular direction; and fourthly, that, in the present state of our knowledge, it is best to accept provisionally the view that they are thus indirectly due to natural selection."

Nevertheless he feels that although the evidence for the transmission of acquired habits is insufficient yet some connexion between variation and modification is suggested by the facts, understanding by "variations" departures of congenital origin and by "modifications" departures which are individually acquired. He has accordingly approached this subject from a new standpoint and has sketched in outline, Chapter 14, "an hypothesis according to which acquired modification may pave the way for congenital variation without any direct transmission as such."

Prof. Lloyd Morgan does not accept Weismann's doctrine of germinal selection as recently expounded in *The Monist* though he regards it as a suggestive hypothesis; it does not follow for him that because in some cases use and disuse can have played no part therefore in no other cases has use-inheritance prevailed. He believes he can accept the facts adduced by the transmissionist and at the same time interpret them on selectionist principles. The gist of his idea is that "persistent modification through many generations, though not transmitted to the germ, nevertheless affords the opportunity for germinal variation of like nature." The modification is not inherited but from having taken place generation after generation variations in the same direction as the modifications are no longer repressed and are allowed full scope. There will arise a congenital predisposition to the modifications in question. Given the plasticity of organisms, given persistent modifications, ever increasing in adaptiveness, germinal variation will follow. "The modification *as such* is not inherited, but is the condition under which congenital variations are favored and given time to get hold on the organism, and are thus "enabled by degrees to reach the fully adaptive level."

The conclusions regarding heredity in man are important and touch the quick of a much vexed question. They approach again to the Weismannian view as will be seen from his own words: "There is little or no evidence of individually acquired habits in man becoming instinctive through heredity. Natural selection becomes more and more subordinate in the social evolution of civilised mankind; and it would seem probable that with this waning of the influence of natural selection there has been a diminution also of human faculty. Hence there is little or no evidence of the hereditary transmission of increments of faculty due to continued and persistent use. A discussion of heredity in man thus confirms the inference drawn from the study of habit and instinct in some of the lower animals." And further: "If those who endeavor to apply biological conceptions to social phenomena would only remember that the essence of natural selection is the exclusion of the weakly, the inefficient, and the anywise unfit, from transmitting their inefficiency, and the consequent hereditary increment of efficiency in those who remain to contribute as parents to the continuation of the race, much confusion of thought would be avoided. In this sense I contend that natural selection is not an important factor in human progress among the civilised races of to-day." Prof. Lloyd Morgan does not believe that the level of human intelligence is rising but only the level of the intellectual and social environment—the

stored up opportunities of intellectual and æsthetic culture. Selection without elimination involves no racial progress. He then puts this problem: "It would seem, in fine, that if mental evolution in man be manifested rather in the progressive advance of human achievement than in progressive increment of human faculty; if the developmental process have been transferred from the individuals to their environment; if it be rather the intellectual and moral edifice that is undergoing evolution, than the human builders that contribute in each generation a few more stones to take a permanent place in its fabric; if there be thus no conclusive evidence that faculty is improving, but rather the opposite; if all this be so, then it would seem that the ground is cut way from under the feet of those who regard mental evolution in man as due to inherited increments of individually acquired faculty. Nay, more; if the average level be not rising, some explanation must be demanded from transmissionists of this fact. For surely if there be transmission of individually acquired increment, the average level of faculty ought to be steadily rising."

The book, both for study and reading, is marked by charm of style, attractiveness of presentation, and soundness of philosophical view. There is a wealth of observation on animal life gathered in it, concisely and entertainingly told. All will draw intellectual edification from its perusal.

T. J. McC.

VORLESUNGEN ÜBER THEORETISCHE PHYSIK. Von *H. von Helmholtz*. Band V  
Electromagnetische Theorie des Lichtes. Herausgegeben von Arthur König  
und Carl Runge. Hamburg. 1897. Pp. 370. Price, 14 Marks.

Helmholtz in his triple rôle of physiologist, physicist, and mathematician is perhaps sometimes forgotten as Helmholtz the educator. It may indeed be doubted whether any one American, dead or living, has ever furnished from the ranks of his own students so many investigators and instructors in physics for American institutions as has Helmholtz.

For a full quarter of a century, the royal university of Berlin was the attracting centre for Americans in search of opportunities in physics, mathematical or experimental. It was there, under the kindly eye and word of the master, that life-long inspiration came to many a student. The volume under review, therefore, is not without a peculiar personal interest for many of its English-speaking readers.

Forming, as it does, the fifth in a series of six volumes, it is nevertheless the first to appear, the lectures having been recorded in stenographic notes by a student during the last semester of their delivery. While the *Electromagnetic Theory of Light* stands as the title of the lectures, they cover really the whole ground of modern optics, both geometrical and physical. Parts III., IV., and V., treating of spherical waves, diffraction and geometrical optics, respectively, would stand intact on any wave-theory of light, being questions of kinematics, not of kinetics. It is when the real nature of luminous disturbances is considered, in Parts I., II., and